

7.0 CONSERVATION ELEMENT

7.1 INTRODUCTION

The purpose of the Conservation Element is to describe the natural resources within the City of Hallandale Beach, and to establish policy direction for consideration of these natural resources in future environmental management activities. The policies contained in this element are designed to enhance the existing natural and physical environment of the community.

7.2 HALLANDALE BEACH'S GOALS, OBJECTIVES, POLICIES

7.2.1 INTRODUCTION

This section presents the City's conservation goals, objectives, and policies. These items were derived from analysis of existing information, present conditions, and ongoing activities.

Water Resources

GOAL 1: The City shall provide and maintain an adequate quantity and quality supply of water for use while minimizing effects on the natural system.

OBJECTIVE 1.1: The City shall continue to provide safe quality potable water for residential, commercial and industrial uses within the City at a level of service standard of 175 gallons per capita per day and promote water conservation.

POLICY 1.1.1: The City, in order to provide safe potable water, shall continue working with other public agencies, such as the Department of Environmental Protection, South Florida Water Management District, and Broward County Health Department, to meet primary and secondary water quality standards mandated by Florida Water Statutes.

POLICY 1.1.2: The City shall continue to encourage installation of water saving devices in new buildings or, where possible, retrofit existing structures for water conservation.

POLICY 1.1.3: The City shall continue and expand water conservation practices to maintain a low per capita consumption of potable water by implementing the capital improvement projects identified in the 10-year Water Supply Facilities Plan including:

- Adopting water restriction ordinances;
- Implementing and enforcing environmentally sound landscaping practices to reduce irrigation demand;
- Expanding the City's water utility leak detection program and the water distribution system leakage programs; and
- Encouraging the expansion of the City's water reuse system.

POLICY 1.1.4: The City shall continue to implement adopted landscaping requirements in accord with the South Florida Water Management District regulations, which encourages planting materials which are low water users (xeriscape).

OBJECTIVE 1.2: The City shall encourage the use of grey water throughout the community.

POLICY 1.2.1: The City will work with the City of Hollywood (supplier of grey water) and large water users within the City to develop ways that grey water can be utilized to reduce overall water consumption.

POLICY 1.2.2: The City will utilize grey water use on public property as feasible.

~~**POLICY 1.2.1:** The City shall implement adopted landscaping requirements in accord with the South Florida Water Management District model regulations, which encourages planting materials which are low water users.~~

OBJECTIVE 1.3: The City shall protect the ground water aquifer within the cone of influence in conjunction with its agreements with Broward County Water Resources Management Division and the Broward County Wellfield Protection Ordinance.

POLICY 1.3.1: The City shall implement land development regulations to be consistent with its Storm Water Management Program, which Program shall be in compliance with the Florida Administrative Code (FAC) 62-40.432(1)-(4) and FAC Chapter 17-40, Water Policy.

POLICY 1.3.2: The City shall require proper water treatment and drainage for all new development, redevelopment areas, and major renovation projects.

OBJECTIVE 1.4: Development of alternative water supplies

POLICY 1.4.1: The City shall continue to explore the development of alternative water supplies to meet future water needs.

POLICY 1.4.2: The City shall utilize alternative water supply sources, if feasible, when improving or expanding the City's water system.

GOAL 2: The City shall encourage natural areas, where they exist, to be improved in larger scale developments or redevelopment situations (5 acres or more).

OBJECTIVE 2.1: The City shall continue to enforce the Tree Preservation Ordinance which requires that existing healthy trees of desirable species be retained on site and incorporated into the design plans for development projects.

POLICY 2.1.1: The City shall encourage saving trees which are not diseased, unreasonably restricting permitted use of property, endangering existing or proposed

structures, creating unsafe vision clearance or otherwise interfering with provision of public services.

GOAL 3: The City shall protect, by regulation, acquisition and/or restoration, existing natural areas.

OBJECTIVE 3.1: The City shall ~~complete~~ encourage the revegetation of properties in the community ~~the beaches of Hallandale Beach~~ by 1998.

POLICY 3.1.1: The City shall implement adopted City policies which permit the removal of identified poisonous, obnoxious and harmful exotic plants.

POLICY 3.1.2: The City shall implement adopted landscaping guidelines which encourage use of native planting materials in all developments.

POLICY 3.1.3: The City shall continue to educate property owners about the importance of landscaping with drought-tolerant, native plants.

GOAL 4: The City shall ~~reestablish~~ preserve and enhance a beach dune and vegetation system for beaches within the City.

OBJECTIVE 4.1: The City, in cooperation with Broward County, shall ~~complete~~ preserve and when feasible, enhance the a hazard mitigation system of dunes with native coastal vegetation and walk throughways to prevent dune and vegetative cover destruction by 1998.

POLICY 4.1.1: The City shall require implementation of beach dune and vegetative protection regulations.

POLICY 4.1.2: The City shall increase protection of natural resources and be more responsive to the potential for dune and vegetative destruction. Standards to protect beach dune and vegetation systems shall be incorporated into Land Development Regulations.

POLICY 4.1.3: The City shall pursue grant programs associated with dune reconstruction.

GOAL 5: The City shall require restoration and protection of native coastal vegetation.

OBJECTIVE 5.1: The City shall comply with Section 208 of the Federal Water Pollution Control Act, as well as the FDEP Stormwater Rule (Chapter 17-25, F.A.C.) to achieve the objective of removing 80 to 90 percent of stormwater pollutants before discharge to receiving waters and will address stormwater run off and the requirement of treatment or detection and filtration in compliance with both ~~DNR~~ Broward County EPD and SFWMD guidelines.

POLICY 5.1.1: The City shall protect native coastal vegetation and encourage restoration, through performance incentives.

GOAL 6: The City shall seek to lessen the degradation of habitats conducive to endangered or threatened species.

OBJECTIVE 6.1: The City shall coordinate annually with the Army Corps of Engineers, U.S. Coast Guard and other appropriate public agencies to distribute information which will advise the boating public on the Manatee's use of the Intracoastal Waterway during their migrations.

POLICY 6.1.1: The City shall review and analyze the placement of no wake speed in the Intracoastal Waterway and other Manatee habitats.

POLICY 6.1.2: The City shall discourage activities which could adversely alter the habitat of endangered or threatened species of special concern should such a habitat or species be identified in the City.

POLICY 6.1.3: The City shall coordinate with the Department of Environmental Protection (DEP) relative to Manatee protection zones and continue to enforce the maximum speed limits and slow speed limitations within 50 feet of either shore as mandated by DEP.

GOAL 7: The City shall seek to better utilize of all public land in the City preserve and expand natural environments within the City.

OBJECTIVE 7.1: The City shall continually implement adopted landscaping regulations and guidelines which incorporate the use of drought resistant and/or native plantings vegetation on pervious areas of public lands and areas of future development.

OBJECTIVE 7.2: The City shall continue to investigate the acquisition of additional public lands to increase viable open space for natural environments and passive community use by 2000.

POLICY 7.2.1: The City shall support proposals to acquire vacant tracts of land for public use.

POLICY 7.2.2: The City shall ~~establish~~ continue to enforce landscaping regulations with performance incentives for preserving and protecting major trees or stands of trees or significant vegetation coverage, ~~by 1997~~ as required by the City Land Development Regulations.

POLICY 7.2.3: The City shall enforce the tree preservation regulations of the City Code to decrease removal of groves or groupings or individual specimens.

OBJECTIVE 7.3: The City shall protect the minimum seasonal flows and levels of surface watercourses by lessening existing degradation of channelized waterways and their impact on natural waterways.

POLICY 7.3.1: The City shall protect marine habitats by establishing guidelines, through collaboration with other appropriate public agencies, under which dredging of water bodies and waterways will be conducted to ensure natural functioning and protection of existing marine habitats.

POLICY 7.3.2: When bridges in the City are replaced, they will be designed in a manner that will not inhibit tidal flushing of waterways.

GOAL 8: The City shall participate in regional mass transit programs and improvements of transportation network to improve air quality levels.

OBJECTIVE 8.1: The City shall continue to support and participate in mass transit networks within the City.

~~**POLICY 8.1.1:** The City shall endorse regional legislative efforts to bring about a mass transit connection at I-95 and Hallandale Beach Boulevard.~~

POLICY 8.1.21: The City will ensure through its ordinances and coordination with other levels of government that both development and transportation systems are consistent with the maintenance of optimum air quality.

POLICY 8.1.2: The City shall continue to operate a City minibus with several intercity routes.

GOAL 9: The City shall encourage the reduction of dependence on fossil fuel energy sources and thereby reduce per capita consumption.

OBJECTIVE 9.1: The City shall work with other communities, FDOT and other appropriate agencies through a designated City representative to evaluate current public and private energy consumption and pursue reasonable alternatives to replace these nonrenewable resources by 2000.

POLICY 9.1.1: The City shall coordinate with Broward County and with other Broward County communities on the strategies and programs to recycle solid waste.

POLICY 9.1.2: The City shall coordinate with other communities to study and evaluate improved energy utilization in providing public facilities and services.

POLICY 9.1.3: The City shall actively investigate and implement energy efficiency improvements in all of its facilities.

GOAL 10: The City shall develop the necessary regulations and programs to identify and require the proper containment and safe disposal of hazardous and non-hazardous wastes.

OBJECTIVE 10.1: The City shall participate in and support the County's efforts in educating the public of hazardous wastes and their proper disposal. Periodic outreach efforts will be implemented by a yearly advertisement in the City and community newsletter.

POLICY 10.1.1: The City shall monitor all waste producers and other routine hazardous waste producers through the permitting process.

POLICY 10.1.2: The City will continue to enforce Federal, State and County regulations requiring special construction processes to ensure the containment and facilitate cleanup of any spill or leak where hazardous materials are to be used, stored, handled or generated.

POLICY 10.1.3: The City shall continue to discourage developments which may handle, generate or store hazardous material from locating within a cone of influence.

POLICY 10.1.4: The City shall promote brownfield redevelopment when possible sites are identified and require an environmental assessment and clean-up of the site as required by the County and Federal government prior to redevelopment.

GOAL 11: The City shall reduce solid waste and wastewater through recycling, recovery and reuse programs.

OBJECTIVE 11.1: The City shall continue to evaluate alternative solid waste treatment programs for solid waste disposal.

POLICY 11.1.1: The City and Waste Management, Inc. shall develop monitoring capabilities to verify the necessary capacity for solid waste disposal in approved landfill facilities.

OBJECTIVE 11.2: The City shall continue to restrict disposal materials collected in order to reduce solid waste flow to the disposal facility.

POLICY 11.2.1: The City shall continue to implement a recycling program of reusable materials.

POLICY 11.2.2: The City shall cooperate through a designated City representative, with public and nonprofit agencies ~~on to~~ developing and distributing educational literature to promote voluntary reduction of solid waste products.

POLICY 11.2.3: The City Sanitation Division shall continue to make spot inspection of garbage containers scheduled for collection to ensure only approved waste materials are being collected.

POLICY 11.2.4: The City will establish a curbside recycling program for all City sanitation customers ~~provide additional recycle drop-off facilities throughout the City.~~ Tonnage of recycled materials shall be tracked and recorded against total waste flows on a monthly basis.

7.3 ANALYSIS

The Conservation Element Goals, Objectives and Policies are designed to react to the existing developed environment and limited natural systems in the City. This section of the Element brings together existing conditions with implementation strategies designed to allow for a compatibility between the built and natural environments.

Water Resources

The water resources within the City of Hallandale Beach are inclusive of lakes, ground water, estuarine and marine systems. While presently drawing upon potable water from the underlying Biscayne Aquifer, the City has partially phased out its well system and a long term supply has been developed with Broward County, neighboring municipalities and SFWMD.

Implementation strategies designed to protect natural water resources in Hallandale Beach include:

- * Cleansing of stormwater runoff before discharge into any city or nearby water systems through retrofitting existing systems and requiring cleansing systems in new development.
- * Prevention of sewage or petroleum discharge from boats in the City's waters.
- * Wake and turbidity control to maintain low silt levels.
- * Protection of Wellfield Cone of Influence to protect the potable water supply.
- * Use of alternative water supplies and low water usage planting for landscaped areas.
- * Other water saving tactics which may be developed to preserve the aquifer from saltwater intrusion.

Coastal and Marine

Hallandale Beach's intense urban development has concentrated along the Intracoastal Waterway and Atlantic Ocean. Throughout the non-coastal areas of the City are man-

made lakes and several canals.

In order to protect and enhance the quality of these resources and maintain waterfront access, the City should:

- * Pursue ~~completion~~ preservation of the dune and vegetative systems along the beach areas ~~adjacent to the Posner property to complete the dune and vegetation system along the entire beaches of Hallandale Beach.~~

- * Continue the beach re-nourishment program to mitigate natural erosion of the beach. Beach vegetation will be installed to preserve re-nourished beach areas and protect landward development.

Natural Systems

Natural systems that once existed in the City either no longer exist, or are significantly reduced due to extensive development activities. In order to retain some vestiges of the natural environment, the City might encourage native vegetation or vegetation conducive to high saline content, to be used in landscaping of development projects in close proximity to the beach. Further investigation of this opportunity would need to be explored for consideration as a development code amendment.

- * Native drought resistant plantings should be encouraged for use by the general population (by ordinance). In order to encourage plantings of low water use species and native species the City should incorporate such materials in its landscaped medians and public facilities where appropriate.

Air Quality

The quality of the air in the city is quite good. Proximity to the ocean allows for the ocean breezes and inland currents to dissipate locally generated pollutants. When possible, protection of or enhancement of air quality could be achieved by state or county programs to reduce or improve upon traffic within the city such as improved mass transit options, lessening curb cuts on arterial streets and improved signalization at intersections.

- * Reduce and control vehicular traffic and other sources of airborne pollutants within the city.

- * Actively participate to reduce the non-point and point source pollutant emissions from surrounding areas that affect the city.

Energy

Air conditioning is a major use of electricity in the City. Reliance upon air conditioning is necessary to combat extreme temperatures and humidity levels prevalent in this region. To economize on energy demands, building and land development codes improve the energy efficiency of various building designs and construction. Reduction of asphalt or shading of paved areas by landscape materials might be achieved through substitution of alternative methods of surfacing parking areas and aisleways to reduce heat retention at the ground surface.

The City is presently involved in a parking lot and landscape improvement program. This will increase the required percentage of permeable area for commercial properties to more than 15 percent of total site area, and require planting and maintenance of trees and other vegetation able to provide shade and reduce solar impact of non-permeable areas.

Mining

Hallandale Beach has some limestone and sand deposits. There had been some mining in the past, but the excavated areas have been incorporated into lakefront residential development. No disturbed areas for resource extraction exist in the City. No significant resource extraction activities are anticipated to occur in the foreseeable future. The City should pursue reclamation of sand dredge sites. Such areas have been generally incorporated into the surrounding residential environment.

Hazardous and Non-Hazardous Materials and Waste

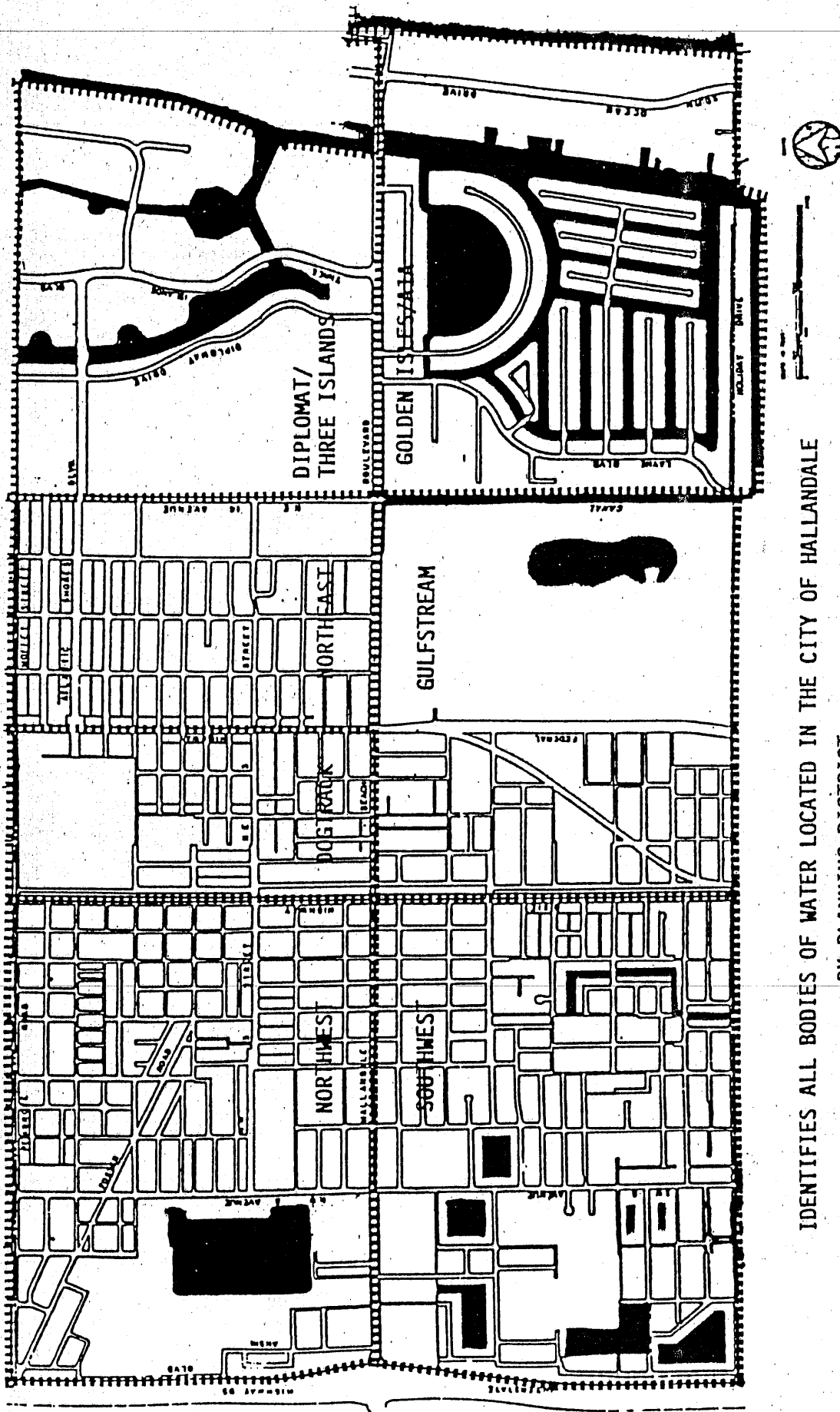
Disposal of hazardous waste in Broward County is monitored and regulated by regional, State, and Federal agencies. The City is not involved in these activities at this time. Separation of hazardous wastes and non-hazardous materials is essential to implementation of any program. The City in conjunction with other jurisdictions, may

need to pursue the improved management practices for the collection, transport and disposal of such wastes by outside contractors.

7.4 INVENTORIES

7.4.1 Water Related Resources

Figure 7-1 identifies all bodies of water located in the City. The eastern portion of the City is served by many waterways and canals which can be utilized by residents for boating and other recreational opportunities. In addition, In the Southwest Planning District, has several lakes and canals located in residential areas that are used for boating. ~~Re Len Lake located in the most southwesterly portion of that district is the only named water body in this planning area.~~



IDENTIFIES ALL BODIES OF WATER LOCATED IN THE CITY OF HALLANDALE
BY PLANNING DISTRICT

Source: City of Hallandale, Growth Management Department

In the Northwest Planning District, there are two bodies of water remaining. Chaves Lake is owned by the City; it abuts industrial property to the west and south. Hallandale High School and residential properties are to the north and east. The City has improved the upland areas around the lake for municipal purposes.

The Gulfstream Planning District has a man-made lake in the center of the Gulfstream Race Track. The Mardi Gras Gaming Center and Northeast Districts have no water related resources.

Venetian and DeSoto Waterways, located in the Diplomat / Three Islands Planning District, are used for recreational boating and have access to the Intracoastal Waterway. The surrounding land use is residential and predominantly multi-family. A small number of single family homes are located on the northern portion of the DeSoto Waterway.

Golden Isles / A1A Planning District has one large lake named Golden Isles Lake with direct access to the Intracoastal Waterway. It is surrounded by multi-family structures and is used primarily for recreational boating. The remainder of Golden Isles is located on finger canals abutting all the lots. One small area is multiple family residential with the remainder in low density single family residential uses. ~~The A1A District~~ The barrier island is bounded by the Intracoastal Waterway to the west and the Atlantic Ocean to the east.

7.4.2 Flood Plains

Hallandale Beach is located on the open coast and is subject to flooding from tidal surges associated with hurricanes. Among the most severe storms to pass through the area were those of September 1926, September 1928, September 1947 and August 1964. Severe damage was suffered due to tidal flooding.

Currently, the City requires that construction sites exceed the 100-year still-water and wave action elevation as defined by base flood elevations shown in the Federal ~~f~~ Flood Insurance Rate m Map (FIRM) for the City. These are minimum elevations for the first floor of new construction. Hallandale Beach should consider the additional hazards of storm surge and wave action, as many older buildings were constructed below the minimum standards for wave height. The potential for flood-related property damage to such structures is high.

In recent years, the City has adopted Article III, Flood Damage Prevention, of Chapter 8, Building & Construction, of the Hallandale Beach Code of Ordinances, which provides standards for design of construction in areas of special flood hazard. (The Florida Building Code provides for adoption by reference of Coastal High Hazard building standards.) These ordinances regulate construction in coastal high hazard areas and shallow flooding areas defined by the Federal Emergency Management Agency (FEMA) standards.

It has been predicted by the FEMA that Hallandale Beach (Community Panel #125110) may flood to US Highway #1 during a class three or 100 year storm. The elevation of stillwater will be approximately 8.5 feet with a wave crest of 13 feet for a class three hurricane or the 100 year storm.

The portion of the City which will be affected by wave action is difficult to determine. Wave heights at the beach are diminished at the beach face by the rising ground elevation. There is additional protection for some buildings by existing seawalls, some of which stand 8-10 feet above the beach surface. However, seawall integrity remains unknown, and in some waterfront areas the seawall is nominal protection at best. Some of the seawalls will be easily over-washed since they are only a foot or two higher than the existing beach surface.

Within Golden Isles Lake, one foot wave heights can be expected at the western shore of the lake. These heights will be quickly reduced by the ground elevation; the projected maximum wave crest will be 7 feet in the lake and at the Miami-Dade County / Hallandale Beach border.

(Source: Flood Insurance Study, Wave Height Analysis for the City of Hallandale Beach, Federal Emergency Management Agency, (Community Panel #125110), July 6, 1982).

7.4.3 Soil & Soil Erosion

Hallandale Beach's entire eastern side is generally Udorthents-Urban Land-Pennsuco Soil Association. These are soils that have been modified by spreading mixed limestone fragments, sand, and shell fill material over the natural surface. Urban land, and very poorly drained, loamy soils are underlaid by limestone in swamps and lowlands. This area was naturally a low-lying swamp with the exception of a tropical hammock strip along the barrier island.

The soils in the US-1 area are Immokalee Urban Land Association. Poorly drained, nearly level, sandy soils that have dark subsoil is underlain by limestone at a depth of more than two inches; most areas have been modified for urban use.

Most of the city's western half consists of Dade-Urban Land Soil Association. The association is comprised of well drained, nearly level, sandy soil that varies greatly in depth to soft limestone, generally between 20 to 40 inches. Most have been modified for urban use.

A strip in the Southwest corner of the Southwest planning district is characterized by Arents-Urban Land Association. These are soils that have been modified for urban use by spreading sandy fill material over the natural soil surface.

(Source: Soil Survey of Broward County, Eastern Part, United States, Dept. of Agriculture, Soil Conservation Service, May 1984).

7.4.4 Beaches and Shorelines

Beaches and shores within Hallandale Beach are described in the Coastal Zone Management Element. Coastal erosion is occurring at a rate of 6% per year. The City is now participating and has previously participated in beach restoration/re-nourishment projects to rebuild the eroded beaches with the Army Corps of Engineers, State Department of Environmental Protection Natural Resources, Broward County Environmental Protection Department Quality Control Board and the Erosion Prevention Control District, and the City of Hollywood.

7.4.5 Wildlife Habitats & Vegetative Communities

Tropical and low hammock areas were present on the barrier island and in the Southwest district. There were large mangrove areas on the coastal side of Hallandale Beach. The western side of the City was "scrub".

This area was first cultivated around the turn of the century and was subject to land development activities associated with the Halland Land Company (1897). Intensive development has essentially eliminated natural vegetative communities and wildlife habitats in the planning area.

Because there are no natural ecological areas remaining in Hallandale Beach, there are no areas containing habitat for endangered and threatened species of wildlife and vegetation, with the following possible exceptions:

- a. The West Indian Manatee, (*Trichechus manatus*), may use the Intracoastal Waterway during its migration to and from more northern waters.
- b. The Bald Eagle, (*Haliaeetus leucocephalus*), with a range of the entire state, however it is highly unlikely the bald eagle nests or hunts in the City.
- c. The Loggerhead Turtle, (*Caretta caretta*), is generally distributed in coastal waters, again no known nesting activity currently occurs on the beaches of Hallandale Beach.

(Source: Endangered & Threatened Wildlife & Plants, January 1, 1987, Dept. of the Interior, US Fish & Wildlife Service).

7.5 POLLUTION PROBLEMS

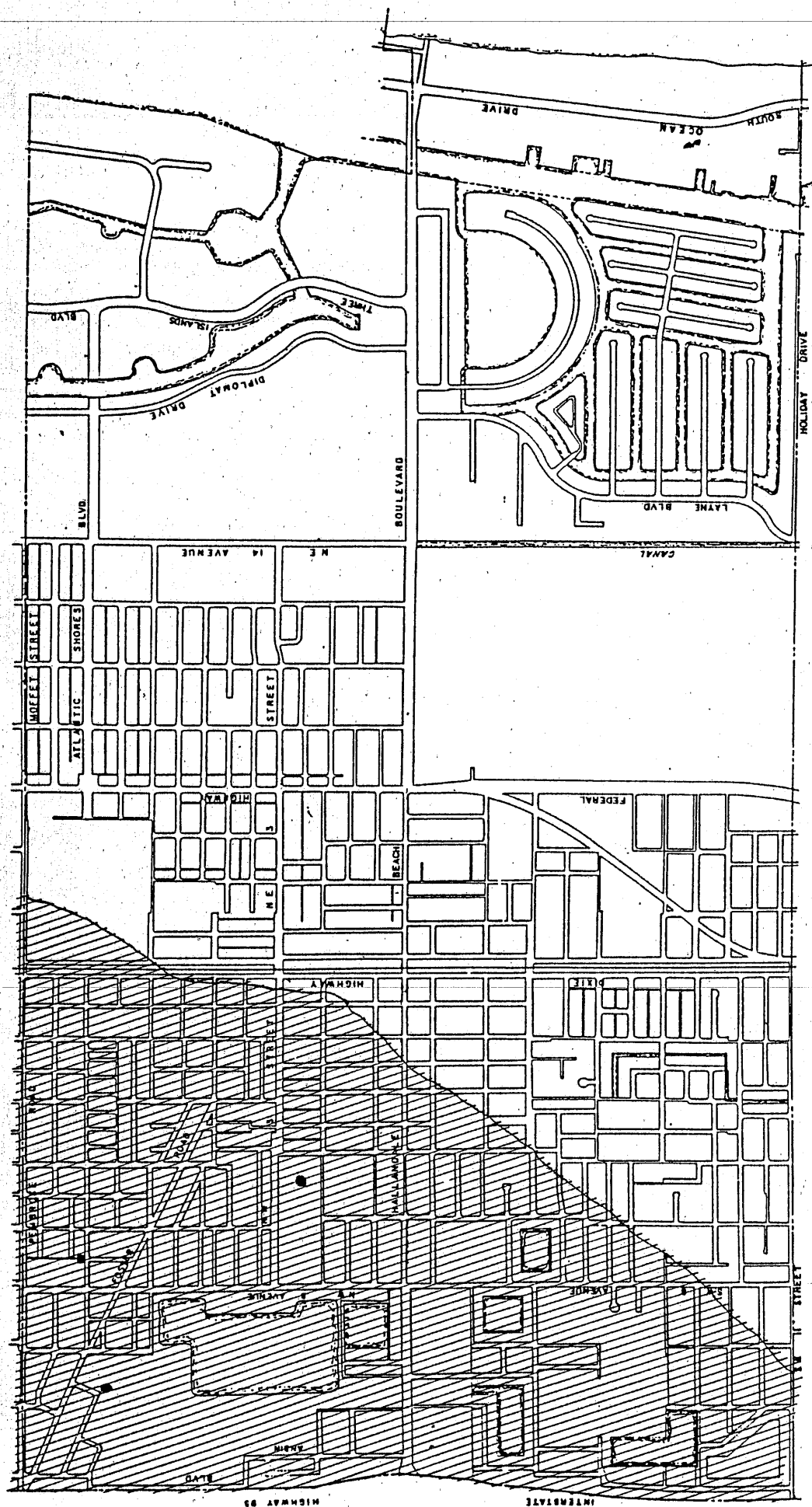
Hallandale Beach does not encourage heavy industry within the City limits, the heaviest zoning category is Industrial-Light, which permits light manufacturing and warehouse uses. As a result there are very few pollution permits for facilities within the city.

7.5.1 Air Pollution

Non-point sources of air pollution include the intersections of I-95 and Hallandale Beach Boulevard, US Highway #1 and Hallandale Beach Boulevard and SR A1A and Hallandale Beach Boulevard. During peak traffic periods localized air quality is greatly affected by idling vehicles. ~~A flyover of the East Hallandale Beach Boulevard and the A1A intersection is planned by the Florida Department of Transportation to be completed by 2002. When changes are accomplished, traffic flow will improve, thereby reducing the concentration of pollutants emitted from the vehicles in Hallandale Beach and surrounding areas.~~ The City completed a Transportation Master Plan in 2008. The Plan includes options for reducing traffic congestion.

7.5.2 Water Pollution

The City had three water production well sites in N.W. Hallandale Beach, which included eight wells. Wells 1, 2, 4, and 6 were closed (August, 1988) due to salt water intrusion problems. Wells 3 and 5 are still used only in emergencies. The two remaining wells (7 and 8) are allowed to continue operation. The wellfield influence area and wells are regularly monitored by the Broward County Water Resources Management Division which is charged with the responsibility of regulating such pollution under the Broward County wellfield protection ordinance requirements. *For a map of the Wellfield Cone of Influence Area see Figure 7-2.



● - Well Site Locations

- Well Field Cone of Influence

CITY OF HALLANDALE FLORIDA

Sources: City of Hallandale, Dept. of Public Works
Bureau of Geology, Information Circular, No. 77, FL. Dept. of Agriculture

According to Broward County, saltwater intrusion is one of the County's more serious water quality issues. The saltwater intrusion area has increased in size over the past 40 50 years due primarily to drainage of freshwater wetlands and increased pumping in the Biscayne Aquifer for domestic and irrigation uses. The City of Hallandale Beach is within one of the ten major wellfields in Broward County which is impacted by saltwater intrusion.

The "1986 Florida Water Quality Assessment 305(b) Technical Report" identifies the estuarine waterways in Hallandale Beach as good (meets the designated use). Finger canals provide the waterways from adjacent developed areas to the Intracoastal Waterway. Water quality in these canal systems is strongly influenced by stormwater runoff.

7.5.3 Mineral Extraction

There are no active sand or limestone dredging sites within the City.

7.5.4 Hazardous Waste

Broward County regulates hazardous waste through their Environmental Quality Control Board. Presently, there are no regulations for residentially produced hazardous waste, such as: oil, paints, insecticides, cleaning fluids, etc. Commercial wastes are identified and disposed of at the Broward County Landfill.

7.6 CURRENT & PROJECTED WATER NEED AND RESOURCES

Water for the City of Hallandale Beach is obtained by pumping from the highly permeable Biscayne Aquifer. The aquifer is composed chiefly of permeable limestone, sandstone, and sand that extends from land surface to a depth of approximately 200 feet. The major source of recharge to the aquifer is rain that infiltrates to the water table. Consequently water levels in the aquifer are high during periods of high rainfall and low during periods of little rainfall.

The configuration of the water table is greatly influenced by the Intracoastal Waterway, the Oleta River, Snake Creek Canal, and municipal pumping. Groundwater level data indicate that the effect from municipal pumping is relatively small. The water-level gradient is gentle; east of the ridge area it is seaward, to the southeast it is toward the Oleta River, and to the southwest it is toward Snake Creek Canal.

Gradients west of the ridge area are nearly flat. During low-water periods, the well field is recharged by inflow from Snake Creek Canal. During high-water periods, water levels in Snake Creek Canal are regulated to aid in lowering water levels in the Hallandale Beach area.

Pumping-test data indicate that large quantities of water are available from the Biscayne aquifer in the area. The chemical quality of the ground water is generally good; the water is relatively hard.

Saltwater contamination of freshwater supplies in Hallandale Beach has been a long standing threat. The wellfield is 2.0 miles west of the Intracoastal Waterway, which is connected to the ocean. The salt front has moved inland, by direct intrusion of sea water, to 0.3 mile east of the well field. Freshwater levels maintained at an elevation above sea level would help to keep the saltwater from moving farther inland into the aquifer. During low-water periods, the freshwater level has been less than 0.8 foot above sea level in the vicinity of the wellfield. During critical dry periods, good management of the fresh water supplies is important in helping to keep saltwater from moving farther inland.

The City of Hallandale Beach is presently pumping an average of 1,277,000,000 gallons of water per year or about 105 million gallons per month from the two remaining wells.

The City supplements raw water from its own wells with raw water purchased from the Broward County Regional Raw Water Supply System and finished water from North Miami Beach to meet its potable water needs. Present water needs are approximately 5.27 million gallons per day of finished water, with a 2018 projection not to exceed 6.8 million gallons per day.